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Agricultural Experiment Station

MORGANTOWN, W. VA.

DEPARTMENT OF PLANT PATHOLOGY

The Chestnut Bark Disease



N. J. GIDDINGS

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THE CHESTNUT BARK DISEASE

A DANGEROUS ENEMY OF WEST VIRGINIA'S CHESTNUT TREES.

The blight or bark disease of chestnut seems to be, in many respects, the worst pest that has appeared in the forests of this country. It is unusual for a disease to destroy the entire growth of a plant in any section, but this blight has been found to attack practically every chestnut tree in its line of advance, leaving in its wake only dead and dying trees of that species. We should be thankful indeed that it has not been found to attack other species of our forest trees since that would seriously complicate matters.

The chestnut timber is of very great value and importance in this state and it would seem well for us to take any reasonable and necessary steps for the prevention or control of the disease in West Virginia. The average annual cut during the past few years is about 118 million feet, and this figure does not include poles, cross ties, or posts.

The value of the nuts is also great, as food for man, or for fattening hogs. Shipments from one railroad station last fall aggregated 155,092 pounds.

We have secured estimates from several lumbermen as to the present standing chestnut timber of the state. These estimates range from *more than* one billion feet to ten billion feet. Taking five billion feet as a reasonable average, and \$3.00 per

In publishing this bulletin on the Chestnut Bark Disease we have drawn freely from all available publications on the subject. We are especially indebted to Dr. Haven Metcalf of the U. S. Department of Agriculture, Mr. A. B. Brooks, former State Forester of West Virginia, and Mr. S. B. Detweiler of the Pennsylvania Chestnut Blight Commission.

thousand as stumpage value, we have a total valuation of \$15,000,000. These figures do not mean a great deal as there are many things to be considered aside from the simple lumber value of the chestnut.

Our West Virginia forests deserve far more attention than they have thus far received, and it is hoped that the publication of this Bulletin will help to bring about some definite action both in regard to the Chestnut Bark Disease and general forestry work in this State.



FIG. 1.—A fine old tree, but dying from the bark disease.

HISTORY.

Attention was first called to this disease by Dr. H. W. Merkle, of the New York Botanical Gardens. During the summer of 1904-5 he noticed that a few of the chestnut trees in the parks appeared to be dying in a peculiar manner, and he brought the matter to the attention of Dr. W. A. Merrill, the Mycologist. In a paper on the subject given in the 1905

report of the Zoological Society Merkel says, "It has spread to such an extent that today it is no exaggeration to say that 98 per cent of all the chestnut trees in the parks of this borough are infected. The spread of this disease is so sudden that unless some radical measures are taken or a natural enemy of this fungus develops, it is safe to predict that not a live specimen of the American chestnut (*Castanea dentata*) will be found two years hence in the neighborhood of the Zoo-



FIG. 2.—A beautiful grove a few years ago, but all chestnut dead now.

logical Park". Valiant efforts were made to save trees which were not yet diseased by spraying them thoroughly with Bordeaux mixture, while many which were only slightly diseased were pruned and repruned, but all of their endeavors availed nothing, and today those great parks are destitute of the chestnut trees.

During the years 1905-6 Dr. Murrill studied the disease in laboratory, greenhouse and park. As a result of his studies he found it to be new and undescribed, tho a fungus similar

to the one which causes this disease is known to occur in Europe. He published a careful description of the disease and its behavior in 1906.

His work was followed by a great deal of discussion as to the cause and importance of the disease, and meanwhile the chestnut trees were dying by thousands and tens of thousands.

The Office of Forest Pathology at Washington, D. C., has devoted considerable time to the study of this disease, especially as to its manner of spreading, distribution, and methods of control.

Pennsylvania was the first state to give the matter serious consideration and more will be said of their work under another heading.

DESCRIPTION.

The disease may attack a tree of any age, and any part of the tree. It is caused by a fungus, and this seems able to start its growth only in wounds of some sort, but when we consider the squirrels, insects, and birds which may make small wounds through the bark it is easy to see that there are numerous points of entrance.

It finds conditions most favorable for its growth just between the bark and the wood. Once started, it spreads rapidly and soon girdles the part upon which it is growing. It is this characteristic of girdling which makes it especially destructive. Only a small amount of tissue is actually invaded by the fungus, but the entire tree, limb, or twig is killed beyond that point. When a twig or limb is diseased, the spores or fruiting bodies of the fungus are washed down toward the trunk, which soon becomes infected and girdled.

The disease is most noticeable during late spring and summer. During this period, the recently killed or dying limbs are easily detected from some distance, on account of their discolored foliage. The leaves on a diseased branch turn to a reddish brown color, and finally wither, but they have a ten-



FIG. 3.—A diseased tree in young chestnut orchard. Note dead leaves clinging to branches.



FIG. 4.—An old tree making its final efforts to live. Girdling at a lower point will soon complete its death.

dency to remain on the tree for some time. The burs on infected branches usually remain on the tree during the winter following its girdling.

Diseased trees very frequently produce sprouts or "suckers" in considerable numbers. These may appear on the trunk or near the base of the tree. Such sprouts soon become infected, however, and very few survive more than two or three years.



FIG. 5.—Young tree showing postules on smooth bark, and sprouts. (See also Fig. 11, page 221.)

A closer examination reveals the diseased band near the base of the affected portion. It is especially conspicuous on smooth bark, causing a reddish brown discoloration and producing numerous little pustules which break through the bark and set free vast numbers of spores. These spore masses are orange colored but vary considerably in appearance according to climatic conditions. During warm, moist weather they are especially prominent and sometimes may be seen as long, curly, yellow threads issuing from the pustule (figure 6).



FIG. 6.—A very close view of a diseased portion. Note the summer spores issuing in long twisted strings from some of the pustules.

Such threads are composed of countless numbers of spores held together by some sticky material. Rains dissolve this adhesive material and carry the spores to lower portions of the same tree or to others standing close by.

When a branch is girdled by cutting around it, there is apt to be an enlargement produced just above the wound, and a similar effect is often noted in limbs attacked by this disease. In fact many of the gross symptoms are exactly similar to those which would be produced by mechanical or insect girdling.

If older portions are attacked, the discoloration and pustule formation are not so evident, as most of the pustules are produced in the fissures of the bark. Such bark, when cut through, is found to be discolored and breaks up easily like punk. Tapping upon this bark will usually produce a peculiar dull sound.

The fungus may continue to grow in the dead bark for some time. It was not generally thought to be capable of growth in the wood, but three investigators, Dr. Caroline Rumbold, W. H. Rankin, and J. Franklin Collins, in different sections of the country have reported finding it upon the wood during the past season. (1)

Besides the common so called summer spores mentioned above, the fungus produces another kind known as the perfect or winter spores. These are darker in color and the pustules are less conspicuous. They are most frequently produced during the late fall, and help the fungus to survive any unfavorable weather conditions.

DISTRIBUTION.

As previously stated, this disease threatens the destruction of all chestnut timber in the Eastern States. At the present time it is known to be present in Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsyl-

(1) This statement is taken from unpublished data furnished by the parties mentioned. Rankin gives a detailed description of the fungus growth on wood and reports finding fruiting pustules on wood entirely stripped of its bark and exposed to weathering.

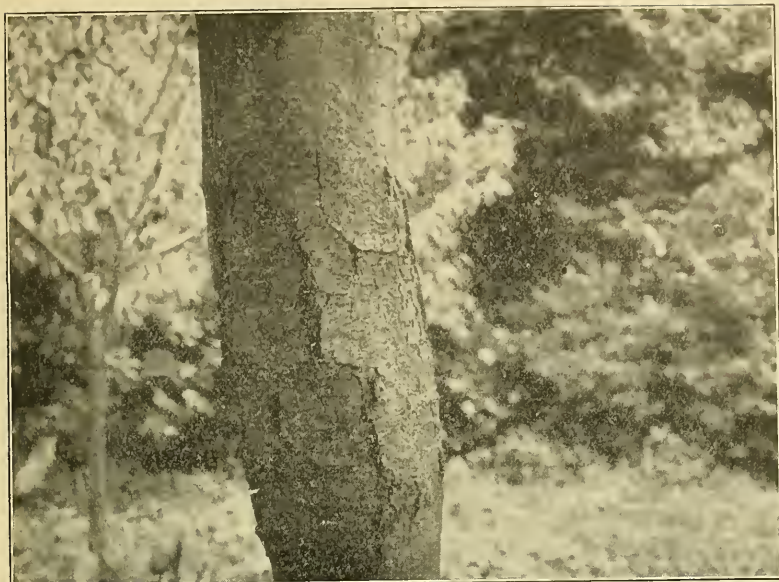


FIG. 7.—A view to show how bark is rotting and cracking.



FIG. 8.—A more advanced stage than fig. 7. Bark peeling off.

vania, Delaware, Maryland, Virginia, West Virginia, and the District of Columbia.

A glance at the map, figure 10, will show how general has been the spread from New York City as a center. In considering this map one should remember that a diseased tree is practically doomed to die. There are numerous diseased areas, especially in Pennsylvania, which have been found since this map was plotted.



FIG. 9.—A view showing complete destruction on young chestnut stand in forest area.

E. R. Hodson, of the U. S. Forest Service, writing of this disease in 1908, says, "In Pennsylvania it is no where abundant yet, although it exists at Easton, South Bethlehem, and Morrisville, and is reported as far north as Pocono Mountains, and as far south now as Philadelphia." In recent correspondence with the Pennsylvania Commission for the investigation and control of this disease, they have sent us a map showing that the area of *general infection* now includes nearly one-half of the state. A similar rapid spread has been recorded in other states and a great united effort should be made to prevent its further progress.

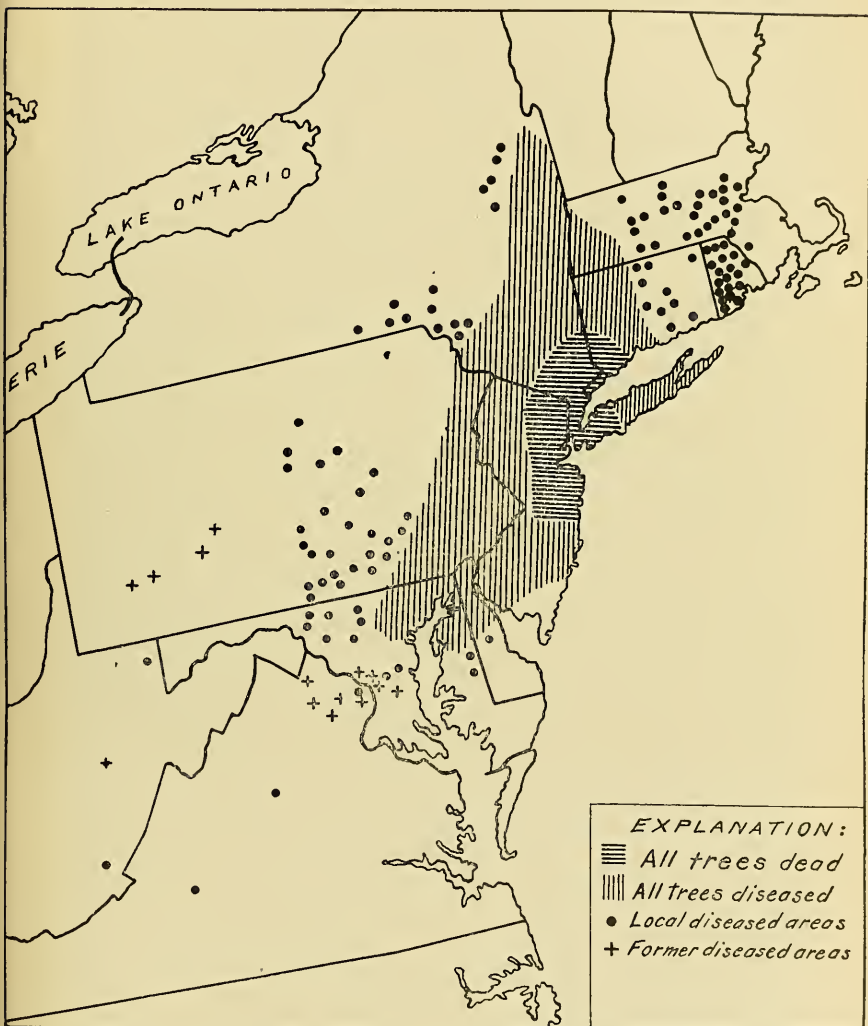


FIG. 10.—Map showing distribution of diseased chestnut. The area of general infection in Pennsylvania is much greater than would be indicated by this map.

Dr. Spaulding, of the U. S. Department of Agriculture, has made careful notes on this disease in the Connecticut Valley during the past three years. In summing up his observations there he states, "There can be no shadow of doubt that in the three years, 1909 to 1911, inclusive, the disease has spread so seriously as to now be beyond hopes of control in the lower Connecticut Valley." (1)

In the case of New Jersey infection is already so general that there is very little hope of saving any chestnut in that state.

Europe is fearful of the disease and Italy has already taken steps to prevent its introduction there.

PREVENTIVE MEASURES.

Numerous experiments have been conducted in the hope of finding some practical method of controlling the chestnut bark disease and some good results have been secured. Those most actively engaged in work along this line at present are the Pennsylvania Chestnut Tree Blight Commission and the Office of Forest Pathology in the U. S. Department of Agriculture.

Spraying appears to be of little value, and, of course, is entirely impractical in forest areas. The method which has finally been adopted aims to prevent the further spread of the disease from the area of general infection and to destroy all diseased trees outside this area. To accomplish the first point, it is essential to establish a line beyond which it will be extremely difficult for the disease to progress. The main, advancing front of the diseased section must come to a point where there are no more chestnut trees within easy range of infection. Large unwooded areas and forest tracts free from chestnut should form as large a part of this boundary line as

(1) From unpublished data furnished by Dr. Spaulding.



FIG. 11.—Note sprout production around base of this diseased tree.

practicable. In other portions it may be necessary to cut all chestnut trees both healthy and diseased, in a belt some miles wide along the line. The disease is left largely to itself in the area enclosed by this line while careful search is made for all diseased trees outside that area and they are destroyed when found. All chestnut timber in the generally diseased area should be cut and utilized as rapidly as possible but the disease will find itself checked upon reaching a boundry destitute of chestnut,—the same as a forest fire when it comes to a broad river.

In the case of individual trees which are quite valuable it is often possible to prolong their lives or even to save them by careful tree surgery. Diseased twigs and small limbs should be removed. The larger limbs and trunk may be treated by carefully cutting away all diseased bark and into the healthy bark around the edges. A layer of wood should also be removed from beneath this bark and the entire wound painted over with coal tar. The tools used for removing bark and wood should be very sharp, so as to make clean, smooth cuts, and the work must be done with great care and thoroughness, if good results are to be expected.

LEGISLATION.

The control of this disease is a matter which requires prompt action on the part of every state where it has been found. These states are all awakening to a realization of the danger from the Chestnut Bark Disease and Pennsylvania, Virginia, and New York have already taken steps to prevent its further spread. Pennsylvania was the first state to make a definite move along this line. Her legislature passed a bill carrying appropriations of \$275,000. for use in investigating and controlling this specific disease. The full title of that act is as follows:

“An act to provide efficient and practical means for the prevention, control and eradication of a disease affecting the chestnut trees, commonly called the chestnut tree blight;

providing for the destruction of trees so affected; creating a commission to carry out the purpose of this act; fixing penalties for the violation of the provisions hereof; and making an appropriation therefor”.

Soon after the passage of the bill, in June 1911, a commission was appointed. At present they have a well organized staff and are preparing for a tremendous campaign against the disease this coming season. They have accomplished much work of value already, and have had a considerable number of trained men in the field all the time. Space will not permit a detailed discussion of their methods, but they would surely serve as a safe model for any other state.

RECOMMENDATIONS.

Since the disease is known to be present in West Virginia, we owe it to ourselves and to neighboring states to take definite and immediate steps for preventing its further spread.

The disease has been found in a number of chestnut nurseries and in several cases local areas of infection have been directly traced to such diseased stock. Any one contemplating the purchase of chestnut trees from nurseries would do well to correspond with the Agricultural Experiment Station at Morgantown, before securing them. Any such trees should be inspected by competent authorities in this state before being accepted or paid for.

Some careful inspection work should be done in the vicinities of the three local infections already reported for this state and in the northern and north eastern portions of the state during the next season.

The control of this disease is a matter of great economic importance to the State of West Virginia, and deserves the serious consideration and hearty co-operation of every citizen. We would urge that everyone make it a point to take careful note of the condition of any chestnut trees which may

come under their observation, especially during the season of 1912. Specimens may be compared with the pictures and descriptions given in this bulletin.

In case there is the least suspicion that a tree is diseased, samples of bark and wood from the girdled portion should be sent to this Station.

We would also be pleased to have correspondence from any one who has made observations which might be of general interest or value, concerning the chestnut or other forest trees of this State.





